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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/516,986

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Joseph B. Kejha

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Zachary T Wobensmith III
7746 101 ST. COURT
VERO BEACH, FL 32967-2871

EXAMINER

BEST, ZACHARY P

ART UNIT

PAPER NUMBER

4191

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DELIVERY MODE

02/27/2008

PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.		Applicant(s)	
	10/516,986		KEJHA ET AL.	
	Examiner		Art Unit	
	Zachary Best		4191	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 06 December 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-21 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-21 is/are rejected.
- 7) ☒ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 06 December 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

LITHIUM BASED ELECTROCHEMICAL DEVICES HAVING A CERAMIC SEPARATOR GLUED THEREIN BY AN ION CONDUCTIVE ADHESIVE

Examiner: Z. Best S.N. 10/516,986 Art Unit: 4191 February 26, 2008

Specification

1. The specification is objected to as failing to provide proper antecedent basis for the claimed subject matter. See 37 CFR 1.75(d)(1) and MPEP § 608.01(o).

Regarding Claims 18-19, the Claims recite a “separator comprises...” The specification does not recite a separator with the limitations of Claims 18-19, and instead recited a ceramic coating slurry with similar limitations. Appropriate correction is required.

Claim Objections

3. Claim 1 is objected to because of the following informalities: “said electrodes include...” should read "said electrodes including..."

4. Claim 10 is objected to because of the following informalities: “...electrolyte is high boiling...” should read “...electrolyte has a high boiling temperature...”

5. Claim 12 is objected to under 37 CFR 1.75(c) as being in improper form because a multiple dependent claim may not be founded on cumulative claiming. See MPEP § 608.01(n).

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6. Claims 18 and 20 are objected to because the using the ranges given, the mixture will at times amount to a sum greater than 100 wt. % when using the maximum amount of one component and the minimum amounts of the remaining components. For example, in Claim 18 if the alpha alumina is set to the maximum claimed amount (75 wt.%), NMP is set to the minimum claimed amount (40 wt.%), and PVDF is set to the minimum claimed amount (2 wt.%), then the mixture will weigh 117 wt%. Appropriate correction is required.

Claim Rejections - 35 USC § 112

7. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

8. Claims 1-20 are rejected under 35 U.S.C. 112, second paragraph as having insufficient antecedent basis for the limitation in the claim because it recites the limitation "...said first electrode active material." For purposes of compact prosecution "said first electrode active material" and "said other electrode" are read as referring to each a sole electrode respective of their placement and bonding with the separator.

9. Claim 19 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which Applicant regards as the invention because the mixture will never be equal to or less than 100 wt.%. The minimum amount the mixture would be as claimed is 105 wt.%

Claim Rejections - 35 USC § 103

10. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

11. Claims 1-4, 9-17, and 21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Aihara et al. (U.S. Patent No. 6,387,565 B1) in view of Arrance et al. (U.S. Patent No. 3,625,771 A), and in further view of Benczur-Urmossy et al (U.S. Patent No. 4,039,729 A).

Regarding Claim 1, Aihara et al. teach a lithium based electrochemical device comprising at least two electrodes (col. 6, lines 23-36, a plurality of unit electrode bodies) and it is suggested that the electrodes will be porous (col. 4, lines 26-37), said electrodes including current collectors active materials coated thereon (col. 6, line 57 to col. 7, line 3), at least one separator between said electrodes (Aihara et al. claim 1), said separator having one side in bonding contact with said first electrode active material (Aihara et al. claim 1), an organic ion-conductive adhesive layer on the other side of said separator in adherent contact with said separator and said other electrode (Aihara et al. claim 1), a non-aqueous electrolyte in contact with said electrodes and said separator (Aihara et al. claim 1), and an enclosure surrounding and containing said device (col. 1, lines 39-45). However, Aihara et al. fail to

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specifically teach the current collectors comprise expanded metal microgrids, and Aihara et al. fail to teach a porous ceramic separator.

Arrance et al. teach an electrochemical device comprising a porous separator to be used between electrodes (col. 2, line 73 to col. 3, line 15), wherein said porous separator is ceramic (col. 3, lines 37-39), wherein the separator may be adhered to the electrodes (col. 1, lines 3-16). Arrance et al. teach that using a porous ceramic separator is advantageous because it has high resistance to alkali and elevated temperatures (Arrance et al. abstract). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to create the electrochemical device of Aihara et al. with a porous ceramic separator because Arrance et al. teach resultant resistance to alkali and elevated temperatures.

Aihara et al. teach that the current collectors comprise of a foil substrate (col. 6, line 63 and col. 7, line 2), and Arrance et al. teach that the current collector is a grid (28). However Aihara et al. and Arrance et al. do not specifically teach the use of an expanded metal microgrid as a current collector. Benczur-Urmossy et al. teach an electrochemical device with a current collector (Benczur-Urmossy et al. claim 1), and Benczur-Urmossy et al. further teach the functional equivalency of a plate, netting, and expanded grid (Benczur-Urmossy et al. claim 10). Therefore, it would have been obvious for one having ordinary skill in the art at the time the invention was made to create the lithium electrochemical device of Aihara et al. and Arrance et al. wherein the electrodes contain current collectors comprising expanded metal grids because Benczur-Urmossy et al. teach functionally

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equivalency of the current collectors as used by Aihara et al. and Arrance et al. with an expanded grid. Furthermore, it is Examiner's position that the term "microgrid" refers to a grid as taught by Benczur-Urmossy et al., but merely denotes the size of the openings. It is further, Examiner's position that the small sized openings would be necessarily present in either Arrance et al.'s grid or Benczur-Urmossy et al.'s expanded metal grid.

Regarding Claim 2, Aihara et al. teach said electrodes are an anode and a cathode (Aihara et al. claim 1).

Regarding Claim 3, Arrance et al. teach said separator contains particles of an electrically insulating material and binder (Arrance et al. claim 1).

Regarding Claim 4, Arrance et al. teach said particles are alumina particles (col. 4, lines 50-55).

Regarding Claim 9, Arrance et al. teach said adhesive is PVDF homopolymer (col. 6, lines 6-17) based and contains at least one aprotic liquid (N-methylpyrrolidone, col. 7, lines 54-59) and at least one salt (col. 5, lines 33-38). N-methylpyrrolidone is an aprotic organic solvent as evidenced by Chen et al. (U.S. Patent No. 5,741,609 A, col. 4, lines 25-33).

Regarding Claim 10, Arrance et al. teach said electrolyte may be a potassium hydroxide solution. It is Examiner's position that a potassium hydroxide solution has a high boiling point and is essentially non-flammable.

Regarding Claim 11, Aihara et al. teach that the separator containing a binder will be in contact with the electrolyte (col. 5, lines 8-65). Therefore, the electrolyte will contain a binder through said contact.

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Regarding Claim 12, Aihara et al. teach the separator binder is of a different polymer than electrodes' binders (col. 7, lines 1-5, electrode binder is PVDF, separator binder is PP/PE/PP).

Regarding Claims 13-16, in view that the combined teaching provides for the claimed elements it is reasoned that the elements are capable of acting as a bi-cell, capacitor, supercapacitor, or double layer capacitor.

Regarding Claim 17, Aihara et al. teach that at least one electrode is smaller than said separator (col. 7, lines 11-14).

Regarding Claim 21, Aihara et al. teach that said separator is coated with an adhesive that is a mixture of polyvinylidene fluoride in a range of 5-10 wt.% (col. 7, lines 54-59 and col. 8, lines 27-32).

12. Claims 5-7 are rejected under 35 U.S.C. 103(a) as being unpatentable over Aihara et al., Arrance et al., and Benczur-Urmossy et al. as applied to Claims 1-4, 9-13, 17, and 21 above, and in further view of Yun et al. (U.S. Patent No. 7,279,251 B1).

Aihara et al., Arrance et al., and Benczur-Urmossy et al. teach an electrochemical device as recited in Paragraph 11 above. However, Aihara et al. and Arrance et al. fail to teach a separator containing fluoride particles.

Regarding Claim 5, Yun et al. teach a secondary battery with a separator comprising inorganic lithium fluoride particles (col. 4, lines 20-25). Yun et al. teach it is advantageous to add a filling agent to a separator because of improved porosity and mechanical strength (col.

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4, lines 18-20). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to create the electrochemical device of Aihara et al. and Arrance et al. with a porous ceramic separator comprising inorganic lithium fluoride particles because Yun et al. teach resultant improved porosity and mechanical strength of the separator.

Regarding Claim 6, Yun et al. teach a separator comprising inorganic fluoride particles (col. 4, lines 20-25).

Regarding Claim 7, Yun et al. teach a separator comprising inorganic fluoride and alumina particles (col. 4, lines 20-25).

13. Claim 8 is rejected under 35 U.S.C. 103(a) as being unpatentable over Aihara et al., Arrance et al., and Benczur-Urmossy et al. as applied to Claims 1-4, 9-13, 17, and 21 above, and in further view of Mitchell et al (U.S. Patent No. 5,824,120 A).

Aihara et al., Arrance et al., and Benczur-Urmossy et al. teach an electrochemical device as recited in Paragraph 11 above. However, Aihara et al. and Arrance et al. fail to teach said adhesive is a PVDF/HFP copolymer.

Mitchell et al. teach an electrochemical cell (Mitchell et al. abstract). Mitchell et al. further teach the functional equivalency of PVDF (col. 8, line 60) and PVDF/HFP (col. 10, lines 34-36) for use as an adhesion material in electrochemical cells. Therefore it would have been obvious to one having ordinary skill in the art at the time the invention was made to create the electrochemical device as taught by Aihara et al., Arrance et al., and Benczur-

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Urmossy et al. wherein the PVDF/HFP is substituted for PVDF as a base for the adhesive because Mitchell et al. teach the functional equivalency of PVDF homopolymer and PVDF/HFP copolymer for use as an adhesive material in an electrochemical cell.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Zachary Best whose telephone number is (571) 270-3963. The examiner can normally be reached on Monday to Thursday, 7:30 - 5:00 (EST).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Dah-Wei Yuan can be reached on (571) 272-1295. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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/Dah-Wei D. Yuan/
Supervisory Patent Examiner, Art Unit 4191